

CLAIM AMENDMENTS

Please cancel Claims 1-18 and insert new Claims 19-33 as follows.

1-18. (Cancelled)

19. (New) A solid-state image pickup apparatus comprising a plurality of pixels each of which includes a converging lens for converging incident light thereinto, a photoelectric conversion element for converting the light converged by the converging lens into an electric signal, and a light-shielding layer including an opening area through which the converged light is coupled to the photoelectric conversion element and a light-shielding area for shielding an area other than the photoelectric conversion element from light, wherein a said pixel positioned in an outer area of a group of said pixels is arranged so that a center of gravity of the opening area is shifted outward with respect to a center of gravity of the converging lens, and

wherein each of the plurality of pixels has a structure so that an optical axis of the converged light passes through a center of gravity of a light-receiving surface of the photoelectric conversion element and also passes through the center of gravity of the opening area included in the light-shielding layer.

20. (New) An apparatus according to claim 19, wherein the plurality of pixels are arranged so that at the more outer position in the pixel group the pixel is positioned, the more the center of gravity of the light-receiving surface of the photoelectric conversion element is shifted in a direction opposite to the center of the pixel group than the converging lens.

21. (New) An apparatus according to claim 19, further comprising a color filter layer arranged on an optical path of the converged light.

22. (New) An apparatus according to claim 19, further comprising a filter layer including an opening area through which the converged light is incident onto the photoelectric conversion element, and a light-shielding area for shielding, from light, an area where the converging lens is not arranged, wherein each of the plurality of pixels is arranged so that an optical axis of the converged light passes through a center of gravity of the opening area of the filter layer.

23. (New) An apparatus according to claim 19, wherein the pixel group is formed by one or two-dimensional arrangement of the plurality of pixels.

24. (New) An apparatus according to claim 19, wherein the pixel group is formed by curved arrangement of the plurality of pixels.

25. (New) A solid-state image pickup apparatus comprising:
a plurality of converging lenses for converging incident light
thereinto;
a pixel group including a plurality of pixels each of which converts
the incident light from the converging lens into an electric signal; and
a plurality of opening areas through each of which the light from the
converging lens is coupled to the photoelectric conversion element,
wherein at least the pixels positioned at peripheral positions of the
pixel group are arranged so that positions of the converging lenses and the opening areas
are shifted toward the center of the pixel group more than the corresponding photoelectric
conversion elements, and a center of gravity of the opening areas are shifted toward the
peripheral portion than the corresponding photoelectric conversion elements, and
wherein each of the plurality of pixels has a structure so that an
optical axis of the light incident from the converging lens passes through a center of gravity
of a light-receiving surface of the photoelectric conversion element and a center of gravity
of the opening area.

26. (New) A solid-state image pickup apparatus comprising:
a plurality of image pickup areas each of which includes
photoelectric conversion areas arranged two-dimensionally;
image pickup lenses provided corresponding to the plurality of
image pickup areas respectively;

microlenses corresponding to the photoelectric conversion areas respectively, each of which is arranged between the image pickup lenses and the corresponding photoelectric conversion areas to converge light; and

opening portions provided correspondingly to the photoelectric conversion areas respectively, through each of which the light is incident onto the corresponding photoelectric conversion area,

wherein in a peripheral area of each of plurality of image pickup areas, positions of the microlenses and the opening portions are shifted toward the center of each of plurality of image pickup areas more than the corresponding photoelectric conversion areas.

27. (New) An apparatus according to claim 26, wherein the center of the microlens and the center of the corresponding opening portion are substantially cocentric with each other.

28. (New) An apparatus according to claim 26, wherein in the peripheral area of the image pickup area, the position of the microlenses are shifted toward the center of the image pickup area than the corresponding opening portions.

29. (New) A solid-state image pickup apparatus comprising:
a plurality of image pickup areas each of which includes photoelectric conversion areas arranged two-dimensionally;

image pickup lenses provided correspondingly to the plurality of image pickup areas respectively;

microlenses for converging light, arranged between the image pickup lenses and the photoelectric conversion areas correspondingly to the photoelectric conversion areas respectively; and

opening portions provided correspondingly to the photoelectric conversion areas respectively, through each of which the light is incident onto the corresponding photoelectric conversion area,

wherein color filters of a same color are arranged in each of the plurality of image pickup areas so that the color filters of different three colors are arranged in the plurality of image pickup areas respectively,

wherein in a peripheral area of each of the plurality of image pickup areas, positions of the microlenses and the opening portions are shifted toward the center of each image pickup area more than the corresponding photoelectric conversion areas, and

wherein shift amounts of microlenses with respect to the corresponding photoelectric conversions areas differs between at least two of the plurality of image pickup areas wherein the color filters of the different colors are arranged respectively.

30. (New) A solid-state image pickup apparatus comprising:

an image pickup area including photoelectric conversion areas arranged two-dimensionally;

microlenses for converging light, formed on a layer evened by a CMP process and arranged between an image pickup lens the photoelectric conversion areas correspondingly to the photoelectric conversion areas respectively; and

opening portions provided correspondingly to the photoelectric conversion are as respectively, through which the light is incident onto the corresponding photoelectric conversion areas,

wherein in a peripheral area of the image pickup area, the positions of the microlenses and the opening portions are shifted toward the center of the image pickup area more than the corresponding photoelectric conversion areas.

31. (New) An apparatus according to claim 30, wherein the center of the microlens and the center of the corresponding opening portion are substantially concentric with each other.

32. (New) A solid-state image pickup apparatus comprising:
an image pickup area including photoelectric conversion areas arranged two-dimensionally;
microlenses for converging light, arranged between an image pickup lens and the photoelectric conversion areas correspondingly to the photoelectric conversion areas respectively; and

opening portions provided correspondingly to the photoelectric conversion areas respectively, through each of which the light is incident onto the corresponding photoelectric conversion area,

wherein in a peripheral area of the image pickup area, positions of the microlenses and the opening portions are shifted toward the center of the image pickup area more than the corresponding photoelectric conversion areas and a pitch of the microlenses in a first area which includes a plurality of microlenses is different from that in a second area which is different from the first area and includes a plurality of microlenses.

33. (New) A camera comprising:

a solid-state image pickup apparatus defined in one of claims 19, 26, 29, 30 and 32;

a lens for focusing light onto the solid-state image pickup apparatus;
and

a signal processing portion which processes a signal from the solid-state image pickup apparatus.